Perioperative Information via the Web Enables Efficiency in Patient Care

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Introduction. In a paper-based medical record system, anesthesiologists often have difficulty obtaining detailed medical information for their patients prior to surgery. Timely, quality information allows the anesthesiologist to develop an optimal treatment plan and foresee anesthesia related supply and equipment requirements. The World Wide Web can provide physicians access to medical information from most popular computer platforms located anywhere on the Internet.[1] This project allows anesthesiologists, using a Web browser, to view detailed perioperative information, request items prior to surgery, and review care guidelines.

System Design. In 1995, the Vanderbilt University Department of Anesthesiology began development of the Perioperative Information Management System (PIMS) to collect information and manage care throughout a patient's surgical experience. The system is composed of preoperative, intraoperative and postoperative modules. A Web interface provides access to complete preoperative reports which contain the patient history, physical examination, laboratory results, other testing results, and the anesthetic assessment and plan. Users can search for preoperative reports by ten criteria such as patient name and age. The system also integrates the preoperative reports with the anesthesiologist assignment schedule and the operating room schedules so anesthesiologists can easily review preoperative reports for their patients based on the scheduled day and operating room. After reviewing the report, the anesthesiologist can request specific supplies and equipment necessary for each case. Prior to surgery, the anesthesiology technicians use a Web browser to review the requests and prepare the operating rooms as requested. The system also hosts anesthesia management guidelines, an electronic version of the preoperative evaluation center's care and testing guidelines, monthly continuous quality improvement reports, and links to other medical center resources.

Implementation. The system runs on an Intel® Pentium®-based platform using Microsoft® WindowsNT® 3.51 Server as the operating system and Microsoft Internet Information Server 1.0 (IIS) for the Web server software. The PIMS system uses Microsoft SQL Server™ 6.5 for the database. The Internet Database Connector (IDC) component of the IIS, in conjunction with Open Data Base Connectivity (ODBC) drivers, are used to access the PIMS database. The system runs scheduled services, designed with Microsoft Visual Basic®, to access operating room data from the medical center's UNIX-based operative services system. Another service obtains updated anesthesiology assignment schedule data from a Microsoft Access® database residing on a departmental server using Novell® Netware® as its operating system. Client Web browsers must support HTML 2.0 and most users use Netscape Navigator™.

Results. The PIMS system went into operation in August 1996 and currently contains over 4000 cases. The Web interface has been available for general use since January 1997 and averages 23 visits per day. Anesthesiologists commonly browse the system from home as well as at the hospital. In March 1997, administrative staff began using the system to assist in billing.

Conclusions. Because of physicians' familiarity with Web browsers, the system's reception has been positive. Use should increase as more physicians become aware of the information that can be retrieved from the system. We are currently migrating the system to WindowsNT 4.0, Internet Information Server 3.0, and Active Server Pages using Microsoft Visual InterDev™. Most scripting and data processing will remain on the server side to continue to allow users to choose any Web browser.

References

1. Cimino JJ, Socratous SA, Clayton PD. Internet as a Clinical Information System: Application Development Using the World Wide Web. Journal of the American Medical Informatics Association, 1995; 2(5): 273-284.

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